

What is claimed is:

1. A motor comprising:

a motor main body that includes a rotatable shaft, which is rotated upon energization of the motor main body;

a gear housing that is joined to the motor main body and receives an output shaft and a speed reducing mechanism, wherein the speed reducing mechanism reduces a rotational speed of the rotatable shaft and conducts the reduced rotational speed of the rotatable shaft to the output shaft, and the gear housing has a main body side connector, from which electric power is supplied to the motor main body;

a control device that controls the motor main body and includes a control circuit board and a circuit board receiving case, wherein:

the control circuit board is received in the circuit board receiving case without being directly joined to the circuit board receiving case and has a circuit board side connector;

the circuit board side connector is installed to the main body side connector in a first direction to supply electric power to the motor main body through the main body side connector; and

the circuit board receiving case includes a gear housing side opening that is installed to the gear housing in the first direction to receive the control circuit board in the circuit board receiving case; and

a fixing means for releasably fixing the control circuit board to the gear housing to prevent movement of the control

circuit board relative to the gear housing in a second direction, which is opposite from the first direction.

2. The motor according to claim 1, wherein the fixing means is for releasably fixing the control circuit board to the gear housing to prevent movement of the control circuit board relative to the gear housing also in the first direction.

3. The motor according to claim 1, wherein the gear housing side opening of the circuit board receiving case is snap fitted to the gear housing.

4. The motor according to claim 1, wherein:

the control circuit board has a fixing portion, which is formed in one of the circuit board side connector and a wall of the control circuit board;

the gear housing includes a pin receiving through hole that penetrates through a wall of the gear housing in a third direction, which is perpendicular to the first direction, wherein the pin receiving through hole of the gear housing is aligned with the fixing portion in the third direction;

the fixing means includes a fixing pin, which includes a pin main body and a removal limiting portion;

the removal limiting portion extends radially outward from a base end of the pin main body, which is opposite from a distal end of the pin main body and is located apart from the fixing portion; and

the distal end of the pin main body is inserted through the pin receiving through hole of the gear housing and is installed to the fixing portion, so that the removal limiting portion engages the wall of the gear housing around the pin receiving through hole of the gear housing.

5. The motor according to claim 4, wherein the fixing portion is formed in the wall of the control circuit board as a fixing through hole, which penetrates through the wall of the control circuit board in the third direction.

6. The motor according to claim 4, wherein:
the fixing pin is entirely received in the circuit board receiving case; and

a wall of the circuit board receiving case is located adjacent to the removal limiting portion of the fixing pin to limit removal of the fixing pin from the pin receiving through hole of the gear housing upon engagement of the wall of the circuit board receiving case with the removal limiting portion of the fixing pin.

7. The motor according to claim 1, wherein the gear housing includes a fitting joint, which is fitted into the gear housing side opening of the circuit board receiving case.

8. The motor according to claim 7, wherein the fitting joint of the gear housing has a hollow interior and receives the main

body side connector in the hollow interior.

9. The motor according to claim 7, wherein the fitting joint of the gear housing receives a portion of the control circuit board and includes a guide portion, which guides the portion of the control circuit board.

10. The motor according to claim 7, wherein an outer peripheral surface of the fitting joint includes at least one protrusion, which aids in press fitting of the fitting joint into the gear housing side opening of the circuit board receiving case.

11. The motor according to claim 1, wherein an inner surface of the circuit board receiving case has at least one guide portion, which guides the control circuit board received from the gear housing side opening of the circuit board receiving case.

12. The motor according to claim 1, wherein:

the gear housing includes a speed reducing mechanism receiving portion, which receives the speed reducing mechanism;

the gear housing is generally flattened such that the speed reducing mechanism receiving portion extends on one side of the rotatable shaft in a direction perpendicular to the rotatable shaft; and

the circuit board receiving case is arranged in a side by side relationship relative to the motor main body in a plane parallel to a plane of flattening of the flattened gear housing

in the direction perpendicular to the rotatable shaft on the one side of the rotatable shaft.

13. The motor according to claim 1, wherein:

the motor main body is installed to the gear housing in a direction parallel to an axis of the rotatable shaft; and

the circuit board receiving case is installed to the gear housing in the first direction, which is parallel to the axis of the rotatable shaft.

14. A method for manufacturing a motor, the method comprising:

installing a control circuit board to a gear housing in a first direction such that a circuit board side connector of the control circuit board is electrically connected to a main body side connector of the gear housing, wherein the gear housing is joined to a motor main body;

releasably fixing the control circuit board to the gear housing by a fixing means to prevent movement of the control circuit board relative to the gear housing in a second direction, which is opposite from the first direction; and

installing a circuit board receiving case to the gear housing in the first direction such that a gear housing side opening of the circuit board receiving case is connected to the gear housing to receive the control circuit board into the circuit board receiving case through the gear housing side opening of the circuit board receiving case.

15. The method according to claim 14, wherein the releasably fixing of the control circuit board to the gear housing by the fixing means also prevents movement of the control circuit board relative to the gear housing in the first direction.

16. The method according to claim 14, wherein the first direction is parallel to an axis of a rotatable shaft of the motor main body.

17. The method according to claim 14, wherein the installing of the circuit board receiving case to the gear housing includes snap fitting the gear housing side opening of the circuit board receiving case to the gear housing.

18. The method according to claim 14, wherein the installing of the circuit board receiving case to the gear housing includes receiving the fixing means into the circuit board receiving case.

19. The method according to claim 14, wherein:
the fixing means includes a fixing pin; and
the releasably fixing of the control circuit board to the gear housing by the fixing means includes installing a pin main body of the fixing pin to a fixing portion of the control circuit board through a pin receiving through hole formed through a wall of the gear housing, so that a removal limiting portion of the fixing pin engages the wall of the gear housing around the pin receiving through hole of the gear housing.